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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/873,674	06/04/2001	Zoran Krivokapic	F0537	5266

7590 05/21/2003

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EXAMINER

FENTY, JESSE A

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 05/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/873,674

Applicant(s)

KRIVOKAPIC, ZORAN

Examiner

Jesse A. Fenty

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 February 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 and 21-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9, 21-23 and 26 is/are rejected.
- 7) ☒ Claim(s) 10-14, 24 and 25 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 4, 23 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Patent No. 5,600,168) in view of Hwang (U.S. Patent No. 5,567,966).

In re claim 1, Lee discloses a semiconductor device, comprising:

A first gate (21) defining a first channel region interposed between a source and a drain region;

A second gate (17) straddling the first gate defining second channel regions interposed between the first channel region and the source and the drain (24); and

A contact (22) connecting the first gate with the second gate.

Lee does not expressly disclose the substrate being an SOI substrate. Hwang discloses a similar device comprising an SOI substrate. It would have been obvious for one skilled in the art at the time of the invention to substitute the SOI substrate of Hwang for the bulk semiconductor substrate of Lee for the purpose, for example, of reducing short-channel effects as sought by Lee and raising the drive capability (Lee; column 2, lines 40-45; Hwang; column 1, lines 11-12).

In re claim 4, Lee in view of Hwang discloses the device of claim 1, wherein the source and the drain include main source and drain regions and source and drain extension regions (24)

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In re claim 23, Lee in view of Hwang discloses the device of claim 1, further including a liner interposed between the first gate and the second gate.

In re claim 26, Lee in view of Hwang discloses the device of claim 1, but does not expressly disclose the dielectric permittivity greater than 3.9. Lee discloses a dielectric comprising the material silicon nitride, which can have a dielectric permittivity in the range of only 2.9. Silicon dioxide, on the other hand, has a dielectric constant on the order of 4.0 (U.S. Patent No. 6,486,557; column 3, lines 16-17. It would have been obvious for one skilled in the art at the time of the invention to use silicon dioxide for the dielectric layer for the purpose, for example, of providing less process steps, as the second dielectric layer of Lee (17) is also silicon oxide.

3. Claims 2, 3 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Hwang as applied to claim 1 above, and further in view of Mandelman et al. (U.S. Patent No. 6,097,070).

In re claims 2, 3 and 21, Lee in view of Hwang discloses the device of claim 1, but does not expressly disclose different ON and OFF states per different gate. As disclosed in the invention, these ON and OFF states are responsive of the different materials of the two gates. Mandelman discloses a similar device to the claimed invention with two different gate electrode materials (25, 26). It would have been obvious for one skilled in the art at the time of the invention to use two different gate layers, for example different doped polysilicon, for the similar purpose of reduced junction leakage by means of lower surface doping level concentration for the channel array (Mandelman; column 3, lines 15-27).

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4. Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Hwang as applied to claim 1 above, and further in view of Tseng et al. (U.S. Patent No. 6,043,545).

In re claims 5 and 7, Lee in view of Hwang discloses the device of claim 1, but does not expressly disclose a silicide layer formed on the main source, drain and second gate regions. Tseng discloses a silicide layer (218) formed on the main source and drain regions. It would have been obvious for one skilled in the art at the time of the invention to include a silicide layer on the source/drain regions of Lee/Hwang for the well-known purpose, for example, of increasing the speed of the semiconductor device.

In re claims 6 and 8, Lee in view of Hwang and further in view of Tseng discloses the devices of claims 1 and 7 respectively, but does not expressly disclose the thickness of the silicide layer being between 100 and 400 angstroms. It would have been obvious to one having ordinary skill in the art at the time the invention was made to determine the optimal thickness of the silicide layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F. 2c 272, 205 USPQ 215 (CCPA 1980).

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Hwang as applied to claim 1 above, and further in view of Liu et al. (U.S. Patent No. 6,218,276 B1).

In re claim 9, as best understood, Lee in view of Hwang discloses the device of claim 1, but does not expressly disclose the two different silicide layers disposed on the separate gate

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regions. Liu discloses the use of two different silicide layers for use in gate structures. It would have been obvious for one skilled in the art at the time of the invention to use two different silicide layers to connect to the separate gate structures of Lee in view of Hwang for the purpose, for example, of creating more design flexibility to define the performance of the device (Liu; column 6, lines 1-10).

6. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Hwang as applied to claim 4 above, and further in view of Chau et al. (U.S. Patent No. 5,625,217).

In re claim 22, Lee in view of Hwang discloses the device of claim 4, but does not expressly disclose the source and drain regions covered with silicide. Chau discloses silicide regions covering source and drain regions of a MOS transistor. It would have been obvious for one skilled in the art at the time of the invention to use silicide layers atop source and drain regions as disclosed by Chau for the device of Lee/Hwang for the purpose, for example, of increasing the speed of the transistor device.

*Allowable Subject Matter*

7. Claims 10-14, 24 and 25 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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*Response to Arguments*

8. Applicant's arguments with respect to claims 1-14 and 21 have been considered but are moot in view of the new ground(s) of rejection.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 703-308-8137. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 703-308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-746-3892 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Jesse A. Fenty  
Examiner  
Art Unit 2815

JAF  
May 18, 2003

  
EDDIE LEE  
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